



ARTIFICIAL PAVEMENT HEATING

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Prepared for
Priority Technology Program

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Problem

Cold weather limitations often restrict asphalt paving operations to the extent that projects fail to be completed on schedule. To overcome the detrimental affects of cold weather, it is suggested that an infrared heater system in advance of paving, or following breakdown rolling might assist in cold weather asphalt paving.

Evaluation

Approach

To evaluate the possible benefit of infrared heaters to assist in cold weather asphalt paving, four conditions were proposed for evaluation. Each test segment was to be approximately 0.4 km long. This field test would evaluate paving at colder temperatures than typically allowed or desired for asphalt paving, below 5 °C.

The following are the four conditions to be evaluated:

1. Paving on cold pavement or base, as a control section.
2. Paving on preheated surface using infrared heaters. Target is to raise the temperature of the top 25 mm to approximately 28 °C.
3. Preheating the surface, and post heating fresh asphalt mixture after laydown.
4. Post heating the fresh paving mixture following breakdown rolling. Target is to raise the average lift temperature to 125 °C.

Criteria

To evaluate the effectiveness of using the infrared heater in cold weather asphalt paving the following criteria were suggested:

1. Monitor ambient, surface, and mixture temperatures during construction.
2. Monitor compactive effort (number of passes) and timing of compaction to maintain consistency during construction.
3. Monitor time needed to obtain necessary heat gain of the surface.
4. Perform laboratory testing (core density, resilient modulus, gradation. And asphalt content) of mixture.
5. Determine the recovered asphalt properties.

The findings of the evaluation were to be documented for possible distribution to appropriate road agencies.

Description

The project consisted of a two lane low volume rural road segment of the Cascade Lakes Highway, in Oregon. Construction was scheduled during the late fall of 1995. Funding was provided from Fiscal Year 1996 Priority Technologies Program funds. The sampling and testing was provided by Oregon State University. Western Asphalt Recycling Equipment supplied the infrared heaters, approximately 8.9 m². The surface temperature was approximately -2°C, and the minimum temperature required for paving is 5°C. The infrared heaters were required to preheat the surface in excess of this minimum so that the surface would not cool below the minimum prior to paving.

Several attempts were made in October 1995 to produce adequate warming of the surface to permit paving. The size of the heater was inadequate to maintain suitable temperatures for production. At paving production speed the surface did not retain sufficient heat to maintain the minimum paving temperature. At slower speeds when the temperature could be maintained, the paving production was inadequate.

Findings

The heaters were too small to provide adequate heat at a production speed for paving. The heater could only heat about a 1.8 m length of roadway and traveled at less than 1m per minute to attain adequate surface heating for paving. This is inadequate for practical production. The evaluation was terminated after one day of failed attempts to preheat one segment at a production rate.

Other contacts were made to find an adequately large heater to obtain a construction production rate. The hot in-place recycling industry currently uses heaters large enough to provide a sufficient heating capability. However, it is not cost effective for them to use only the heating unit of the equipment outside the typical recycling configuration.

Costs

The project was terminated when the production rate could not be attained from the infrared heat source. Mobilization and one day of operation was paid for the attempted evaluation, amounting to \$1800. There were no samples or tests taken, and no costs were incurred for those tasks. The balance of the PTP funds were returned.

Conclusion

The use of infrared heaters to assist in cold weather asphalt paving is not considered practical with the typical equipment available at this time.

No further evaluation is recommended at this time.